

Equipment Condition Report

Overall Diagnosis

NORMAL

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Machine ID: **Flag Gangos - Pump 2 - Port**
 Application: **Hydr system**
 Make/Type:
 Cust. Order N°:
 Product: Shell Tellus T 32

Product (h/km):
 Machine (h/km):
 Filter (h/km):
 System (l):
 Top-up (l):

Lab Sample N°: **GP897**
 Label N°:
 Equipment Ref. N°: **LGP660**
 Sample Taken: 29/10/2014
 Sample Received: 03/11/2014

GP897

29/10/2014

NORMAL

Comments Oil Condition:

Visual aspect: dark yellow coloured, clear and bright, without visual foreign matter.

The water content is not significant: 87 ppm.

The kinematic viscosity @40°C, 32.04 mm²/s, complies with the mentioned ISO VG32 specification limit.

The kinematic viscosity @50°C is 22.18 mm²/s

The kinematic viscosity @60°C is 16.05 mm²/s

The kinematic viscosity @70°C is 12.04 mm²/s

The kinematic viscosity @100°C is 6.03 mm²/s

The oil's acidity is considered acceptable for this application: 0.46 mgKOH/g.

The ICP spectrometry reveals traces of copper, iron and tin.

Comments Machine Condition:

The WPC is used to establish a wear baseline because the WPC remains more or less the same from sample to sample over a period of time as long as a machine is operating normally. The current WPC, 8.1 is difficult to diagnose without historical data, but is considered as normal for a hydraulic system.

The microscopic evaluation of the ferrogram shows that the ferrous wear primordially consists of small rubbing wear platelets, <15 µm. The few larger ferrous wear particles observed are a cutting wear particle of 170 µm and some flakes with max. size of 20 µm. The amount of dark and red ferrous oxides is acceptable.

The non-magnetic wear particles observed are small, <15 µm, blank metal particles. Their amount is limited.

The amount of pollutants is acceptable with mostly sand/dust/silt..particles and lube degradation products

Recommendations:

Without historical data it is difficult to give adequate recommendations, but based on current analysis results we are inclined to diagnose this sample "Normal".

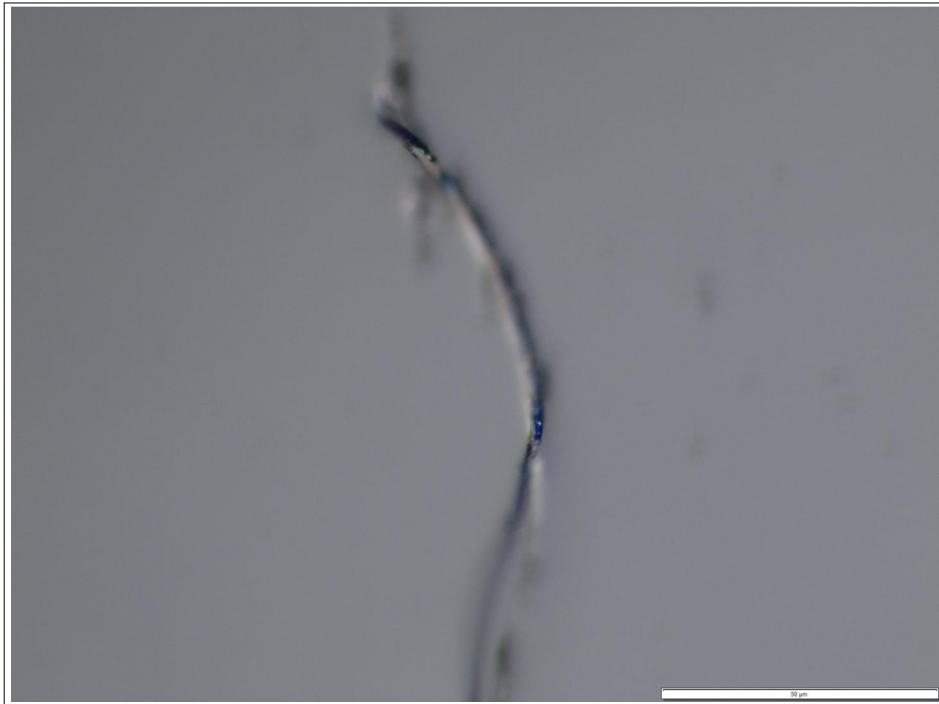
No specific maintenance actions are recommended.

Sample Reported: 06/11/2014 Martine De Neve

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Test Name	Method	Unit	Results
			GP897
PHYSICAL-CHEMICAL ANALYSIS			
Colour	ASTM-D1500	-	2.5
Visual appearance	OMS 13882	-	clear
Determination of water (KF)	ASTM-D6304	ppm	87
Kinematic Viscosity @40°C	ASTM-D445	mm²/s	32.04
Kinematic Viscosity @100°C	ASTM-D445	mm²/s	6.030
Acid Number (AN)	ASTM-D664	mg KOH/g	0.46
ELEMENTAL ANALYSIS			
Aluminium (Al)	ASTM-D5185	ppm	0
Barium (Ba)	ASTM-D5185	ppm	0
Calcium (Ca)	ASTM-D5185	ppm	33
Chromium (Cr)	ASTM-D5185	ppm	0
Copper (Cu)	ASTM-D5185	ppm	6
Iron (Fe)	ASTM-D5185	ppm	2
Magnesium (Mg)	ASTM-D5185	ppm	29
Molybdenum (Mo)	ASTM-D5185	ppm	0
Sodium (Na)	ASTM-D5185	ppm	4
Nickel (Ni)	ASTM-D5185	ppm	0
Phosphorus (P)	ASTM-D5185	ppm	298
Lead (Pb)	ASTM-D5185	ppm	0
Silicon (Si)	ASTM-D5185	ppm	0
Tin (Sn)	ASTM-D5185	ppm	4
Zinc (Zn)	ASTM-D5185	ppm	282
Potassium (K)	ASTM-D5185	ppm	0
WEAR INDEX			
Optical density - large	OMS 13875	-	5.6
Optical density - small	OMS 13875	-	2.5
WPC - Wear Index	OMS 13875	-	8.1
% Large particles	OMS 13875	%	38
ANALYTICAL FERROGRAPHY			
FERROUS			
Normal rubbing wear (FW-NR)	ASTM-D7690	µm max.	< 15
Severe sliding wear (FW-SS)	ASTM-D7690	µm max.	
Abrasive wear (FW-AW)	ASTM-D7690	µm max.	170
Fatigue chunks (FW-FC)	ASTM-D7690	µm max.	
Fatigue flakes (FW-FF)	ASTM-D7690	µm max.	20
Spheres (FW-S)	ASTM-D7690	µm max.	
Dark oxides index (FW-DOI)	ASTM-D7690	-	2
Red oxides - Rust index (FW-ROI)	ASTM-D7690	-	2
Corrosive wear (FW-Cor)	ASTM-D7690	µm max.	
Ferrous wear - Severity index (FW-SI)	ASTM-D7690	-	3
NON-FERROUS			
White metal alloy wear (NFW-WM)	ASTM-D7690	µm max.	< 15
White metal - Severity index (NFW-WMI)	ASTM-D7690	-	1
Copper alloy wear (NFW-Cu)	ASTM-D7690	µm max.	
Copper alloy index (NFW-Cul)	ASTM-D7690	-	
Non ferrous - Severity index (NFW-SI)	ASTM-D7690	-	1
CONTAMINANTS			
Crystalline particles index (Con-CPI)	ASTM-D7690	-	2
Amorphous particle index (Con-API)	ASTM-D7690	-	1
Friction polymer severity index (Con-FPI)	ASTM-D7690	-	2
Fibres - Severity index (Con-Fibl)	ASTM-D7690	-	1
Other contaminants index (Con-OCI)	ASTM-D7690	-	1
Contamination severity index (Con-SI)	ASTM-D7690	-	2

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Ferrous cutting wear particle.